

MECHATRONICS

Mechanics ~ Electronics ~ Control

An International Journal

Editors-in-Chief

R W Daniel

J R Hewit

Volume Contents and Author Index for Volume 2, 1992



Pergamon Press

Oxford • New York • Seoul • Tokyo

MECHATRONICS

Editors-in-Chief

DR R. W. DANIEL, Department of Engineering Science, University of Oxford, Parks Road, Oxford OX1 3PJ, U.K. (Tel: 0865-273153; Fax: 0865-273153).

PROFESSOR J. R. HEWIT, Department of Mechanical Engineering, University of Technology, Loughborough, Leicestershire LE11 3TU, U.K. (Tel: 0509-223210; Fax: 0509-232029).

Editorial Advisory Board

DR E. M. ABAJEVA
Bulgarian Academy of Sciences
1113 Sofia, Bulgaria

PROFESSOR H. ADELI
Ohio State University
Columbus, OH, U.S.A.

PROFESSOR N. ASPRAGATHOS
Machine Design Laboratory
26000 Patras, Greece

PROFESSOR A. P. BESSONOV
Academy of Sciences of Russia
Moscow-Centre 101000, Russia

PROFESSOR DR IR H. VAN BRUSSEL
Katholieke Universiteit Leuven
Leuven, Belgium

MR B. DAVIES
Imperial College
London, U.K.

PROFESSOR TAKASHI EMURA
Tohoku University
Sendai, Japan

DR R. FEARING
University of California
Berkeley, CA, U.S.A.

PROFESSOR S. HACKWOOD
University of California
Riverside, CA, U.S.A.

DR G. HIRZINGER
DFVLR Inst. for Flight Systems Dynamics
Wessling, Germany

DR KOJI IKUTA
Kyushu Institute of Technology
Iizuka-shi 820, Japan

PROFESSOR L. K. KEYS
Louisiana State University
Baton Rouge, LA, U.S.A.

DR J. MAKRA ERNÖE
Ibrahim U. 9
H-1113 Budapest, Hungary

DR J. MARCHANT
Institute of Engineering Research
Silsoe, U.K.

PROFESSOR A. MORECKI
Warsaw University of Technology
Warsaw, Poland

PROFESSOR D. S. NAIDU
Idaho State University
Pocatello, ID, U.S.A.

DR M. E. PRESTON
University of Technology
Loughborough, U.K.

PROFESSOR G. RZEVSKI
Open University
Milton Keynes, U.K.

PROFESSOR P. TAYLOR
University of Hull
Hull, U.K.

DR J. P. TREVELYAN
University of Western Australia
Nedlands, Australia

PROFESSOR C. VIBET
Université Paris XII
91011 Evry, France

PROFESSOR M. VUKOBRATOVIC
Institut Mihajlo Pupin Beograd
11000 Beograd, Yugoslavia

DR D. YOERGER
Woods Hole Oceanographic Inst.
Woods Hole, MA, U.S.A.

Aims and Scope

Mechatronics in its fundamental form can be regarded as the fusion of mechanical and electrical disciplines in modern engineering processes. It is a relatively new concept relating to the design of systems, devices and products aimed at achieving an optimal balance between basic mechanical structure and its overall control.

The purpose of this journal is to provide rapid publication of topical papers featuring practical developments in mechatronics. It will cover a wide range of application areas including consumer product design, instrumentation, manufacturing methods, computer integration and process and device control, and will attract a readership from across the industrial and academic spectrum.

Particular importance will be attached to aspects of innovation in mechatronics design philosophy which illustrate the benefits obtainable by an *a priori* integration of functionality with embedded microprocessor control. A major item will be the design of machines, devices and systems possessing a degree of computer based intelligence. The journal seeks to publish research progress in this field with an emphasis on the applied rather than the theoretical. It will also serve the dual role of bringing greater recognition to this important area of engineering.

Mechatronics publishes the following types of papers:

Communications provide rapid publication of important new contributions. Authors are encouraged to submit their manuscripts in camera-ready form and may FAX manuscripts prepared in this way to the Editors-in-Chief.

Articles should describe the original research of high quality and timeliness in the field of mechatronics.

Reviews will generally be specially commissioned, however, suggestions for topics and authors are welcomed by the Editors-in-Chief.

Publishing, Subscription and Advertising Offices: Pergamon Press Ltd, Headington Hill Hall, Oxford OX3 0BW, U.K. or Pergamon Press Inc., 660 White Plains Road, Tarrytown, NY 10591-5153, U.S.A.

Annual Subscription Rates 1992

Annual institutional subscription rate (1992): £135.00 (US \$245.00). Two-year institutional rate (1992/93): £256.50 (US \$465.50). Sterling prices are definitive. US dollar prices are quoted for convenience only, and are subject to exchange rate fluctuation. Prices include postage and insurance and are subject to change without notice. Personal subscription rates for those whose library subscribes at the regular rate are available on request. Subscription rates for Japan are available on request.

Published six issues/annum in February, April, June, August, October and December

Copyright © 1992 Pergamon Press Ltd

Application to mail at second class postage rate is pending at Rahway, NJ. Postmaster send address corrections to *Mechatronics*, c/o Pergamon Press Inc., 660 White Plains Road, Tarrytown, NY 10591-5153, U.S.A.

Whilst every effort is made by the publishers and editorial board to see that no inaccurate or misleading data, opinion or statement appear in this journal, they wish to make it clear that the data and opinions appearing in the articles and advertisements herein are the sole responsibility of the contributor or advertiser concerned. Accordingly, the publishers, the editorial board and editors and their respective employees, officers and agents accept no responsibility or liability whatsoever for the consequences of any such misleading data, opinion or statement.

Volume Contents

Volume 2 Number 1

P. J. KYBERD and P. H. CHAPPELL	1	Object-slip detection during manipulation using a derived force vector
S. H. HOPKINS, F. EGHTEHARI and D. T. PHAM	15	Algorithms for processing data from a photoelastic slip sensor
J. SWEVERS, D. TORFS, F. DEMEESTER and H. VAN BRUSSEL	29	Fast and accurate tracking control of a flexible one-link robot based on real-time link deflection measurements
D. G. GWEON and H. D. KIM	43	Development of a mobile robot controlled by three motors for a hostile environment
G. SCHWEITZER	65	Mechatronics—a concept with examples in active magnetic bearings
H. J. PARK and H. S. CHO	75	On the realization of an accurate hydraulic servo through an iterative learning control
S. J. OVASKA	89	Electronics and information technology in high-range elevator systems
H. BLOMQUIST and J. HAAKER	101	Hardware estimation method for embedded systems
	i	Instructions for the submission of camera-ready copy

Volume 2 Number 2

R. J. KLINE-SCHODER and M. J. WRIGHT	115	Design of a dither mirror control system
Y.-J. LIN and T.-S. LEE	129	Comprehensive dynamic modeling and motion/force control of flexible manipulators
P. P. ACARNLEY and R. S. CAINE	149	An optical-fibre commutator for brushless D.C. drives
S. CETINKUNT and J. WOLOSZKO	159	A computer aided design and analysis software for motor sizing in servo control systems
C. ZIELIŃSKI	171	Description of semantics of robot programming languages
V. ČOP	199	Methodology of mechatronics system decomposition
G. G. ROGERS	207	Furthering the modular production concept: control systems for actuators
	i	Instructions for the submission of camera-ready copy

Volume 2 Number 3

SPECIAL ISSUE MECHATRONICS—A KEY COMPETENCE IN FINLAND

V. SALMINEN	219	Editorial
V. SALMINEN, A. VERHO and T. LAURILA	221	The Finnish Mechatronics Program—educational, research and industrial applications
P. VIITANEN, T. YLI-PIETILÄ, P. YLI-PAUNU and R. SUORANTA	231	Modelling and simulation of mechatronic devices
J. HEILALA, T. ROPPONEN and M. AIRILA	239	Mechatronic design for industrial grippers
V. SALMINEN and A. VERHO	257	Systematic and innovative design of a mechatronic product
T. VIRVALO	277	Distributed motion control in hydraulics and pneumatics
H. HUOVILA, J. SIIRTOLA, A. VIRTANEN and P. PEUSSA	289	General purpose valve amplifier with field bus interface
M. LAHDENPERÄ	301	Severe environment electronics
S. J. OVASKA	311	Adaptive velocity loop in elevator control—potential problems and a practical solution
M. LUOMARANTA, M. VILENIUS and I. AHONJOJA	321	Programmable electrohydraulic mobile valve
	I	Instructions for the submission of camera-ready copy

Volume 2 Number 4

B. ROBERTSON	329	TELEMAN: progress during the first year
J. P. KARUNADASA and A. C. RENFREW	347	Robust microprocessor control of a brushless d.c. motor driving variable inertia loads
X. Q. CHEN and M. SARHADI	363	Investigation of electrostatic force for robotic lay-up of composite fabrics
M.-C. SHIH and C.-K. CHEN	375	An experimental study on the hydraulic oscillator position control by using the model-following optimal control method
C. W. STAMMERS, P. H. PREST and C. G. MOBLEY	391	A friction drive robot wrist: electronic and control requirements
R. W. DANIEL and Y. F. LI	403	A solution to the problems in deriving true robot end velocity

Volume 2 Number 5

SPECIAL ISSUE MECHATRONICS IN JAPAN

J. R. HEWIT	415 Editorial
T. EMURA, A. ARAKAWA and M. HASHITANI	417 Development of high speed servo-spindle for NC gear grinding machines
I. HAYASHI, N. IWATSUKI, M. KAWAI, J. SHIBATA and T. KITAGAWA	433 Development of a piezoelectric cycloid motor
N. HENMI, K. SATO, S. WADA and A. SHIMOKOHBE	445 A six-degrees of freedom fine motion mechanism
T. TAKAHASHI and H. INOOKA	459 Swinging up of a pendulum by manual control
M. KAJITANI and T. MASUDA	471 Recording method for high accurate rotary magnetic scales
H. MAEKAWA, K. YOKOI, K. TANIE, M. KANEKO, N. KIMURA and N. IMAMURA	483 Development of a three-fingered robot hand with stiffness control capability
H. FUJITA, A. OMODAKA, K. B. SIM and H. HASHIMOTO	495 Position control of an electrostatic linear actuator using rolling motion
M. SAKAMOTO, K. SASAKI and T. KOBORI	503 Active structural response control system
	I Instructions for the submission of camera-ready copy

Volume 2 Number 6

T. H. LEE, T. S. LOW and H. K. LIM	521 A technique for acceleration control with application to real- time control of a BLDC drive
A. NISHI	543 A biped walking robot capable of moving on a vertical wall
H. EKEROL and D. C. HODGSON	555 A machine vision system for high speed object tracking using a moments algorithm
T. D. HALPIN, H. K. KAGHAZCHI and M. M. AHMAD	567 Distributed control of manufacturing cells in a Unix environment
H. J. PARK and H. S. CHO	577 A fuzzy rule-based iterative learning control method with application to hydroforming processes
T. H. LEE, C. C. HANG, L. L. LIAN and B. C. LIM	595 An approach to inverse nonlinear control using neural networks

M. ROUFF

613 Computation of feedback laws for static linearization of nonlinear dynamical systems

i Instructions for the submission of camera-ready copy

I Volume Contents and Author Index for Volume 2, 1992

